NOVEL AND EFFICIENT THERMAL ERROR REDUCTION STRATEGY FOR MACHINE TOOL PERFORMANCE IMPROVEMENT

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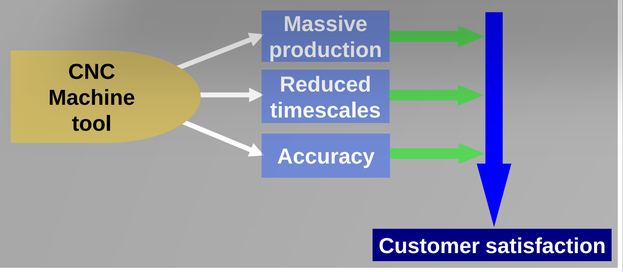
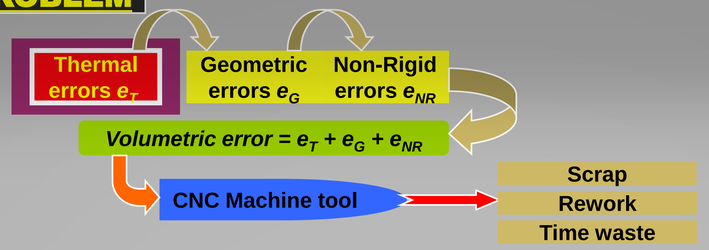
1. INTRODUCTION

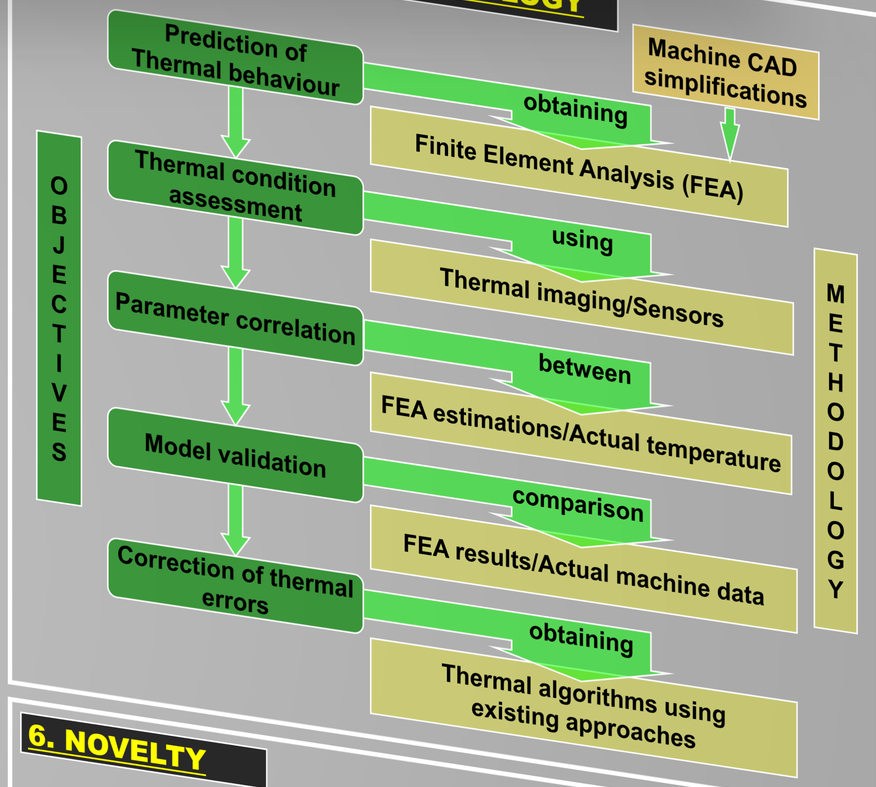


2. THE PROBLEM



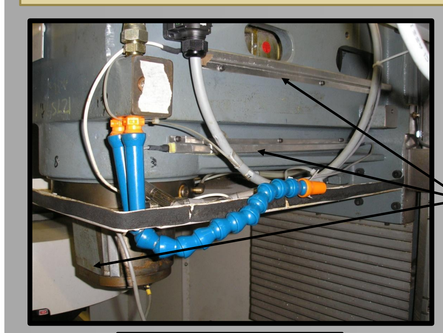
Thermal error represents 70% of the total volumetric error

3. OBJECTIVES AND METHODOLOGY

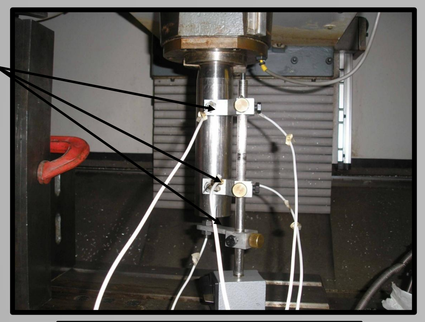


4. THERMAL ANALYSIS

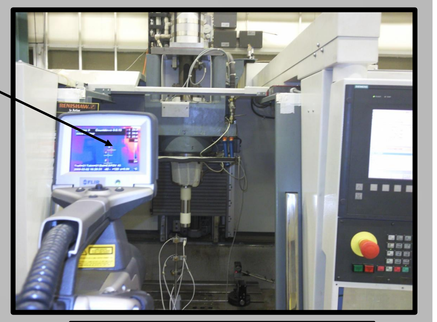
4.1 EXPERIMENTAL MACHINE TESTING - ONLINE ANALYSIS



Machine head

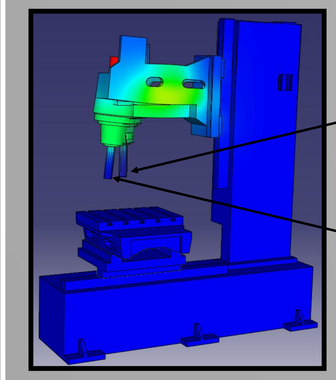


Tool

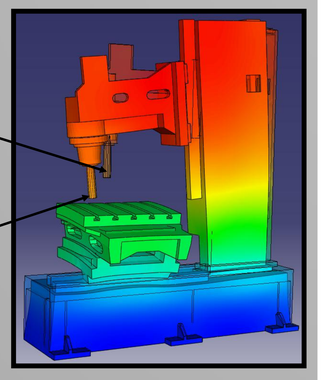


Machine's front view

4.2 FINITE ELEMENT ANALYSIS (FEA) - OFFLINE ANALYSIS

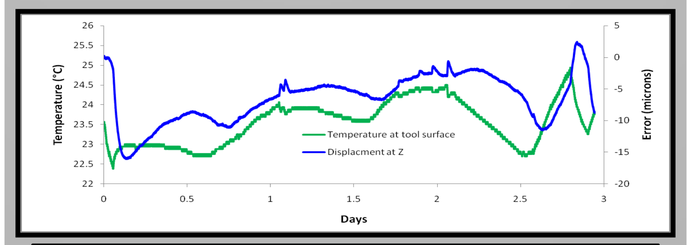


Deformation due to internal heating

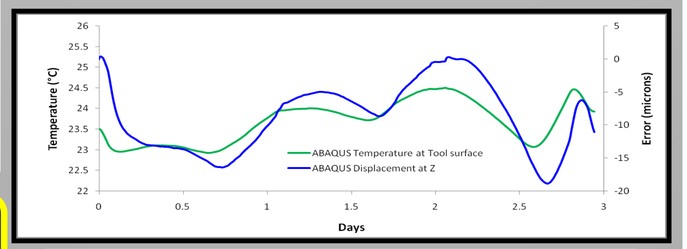


Deformation due to environmental variations

5. RESULTS



Experimental temperature and displacement profiles



Simulated temperature and displacement profiles

70% to 86% correlation achieved in experimental and FEA simulated displacement results

6. NOVELTY